

Chapter 1

Welcome and Introduction

- Introduction to Volunteer Water Quality Monitoring Training Notebook -

I. Volunteer Water Quality Monitoring Program

This program is a partnership between the Missouri Departments of Conservation (MDC) and Natural Resources (DNR), the Conservation Federation of Missouri (CFM), and the citizens of Missouri.

- **MDC** is responsible for managing Missouri's forest, fish and wildlife resources and is concerned about water pollution impacting these resources.
- **DNR** is the regulatory agency in Missouri and has authority over water, air, solid waste, environmental hazardous waste, and mining. DNR also has responsibility for parks, energy, geology, land survey, etc.
- **CFM** is an organization for citizens concerned about Missouri's natural resources and environmental issues. CFM is the Missouri affiliate of the National Wildlife Federation.
- **CITIZENS.** We need your help. We need your eyes, ears, hands, and minds to help care for Missouri's streams.

II. Water Quality Standards

There are several major elements that are included in the Water Quality Standards process. Classified waters (those that maintain water during low flow periods in dry weather) are given designated uses to protect the public's health, preserve the public's use and recreation, and to protect fish and wildlife. These uses may already exist or they may be goals that can be attained in the future with improved water quality.

Some designated uses include:

- Wildlife watering
- Public drinking water
- Whole body contact recreation
- Fish consumption by people
- Irrigation
- Protection of aquatic life and/or livestock

Waters classified for drinking water supplies have maximum allowable concentrations for additional chemicals in the standards with particular concern for human health. Waters protected for whole-body-contact recreation, such as swimming or water skiing, also have a maximum allowable bacteria standard. States define their Water Quality Standards in terms of these designated uses or goals and in terms of scientifically determined criteria that limit pollutants to the level needed to protect the designated use.

Water Quality Standards form the basis of water quality pollution control permitting. Designated use of the waters, criteria to support that use, and general criteria including anti-degradation policies are the infrastructure for the standards. Water Quality Standards for designated uses of all classified water bodies in Missouri set maximum allowable concentrations for 110 chemicals, as well as other criteria such as dissolved oxygen.

Section 303(c) of the Clean Water Act requires states to review these standards at least once each three-year period for the purpose of reviewing applicable Water Quality Standards and/or adopting new standards. At least one public hearing must be held on proposed changes.

Whenever water quality is not protective of the designated use for a water body, that water body is designated as water quality limited, or impaired. Missouri's impaired waters are listed in compliance with 303(d) requirements under the Clean Water Act. The 303(d) List helps state and federal agencies keep track of waters that are impaired

but not addressed by normal water pollution control programs. It is crucial to note that often only a segment of a stream is listed on the 303(d) List. When a segment is listed, that does not mean that water quality is impaired for the entire stream, but only within the designated segment. Special emphasis is then given to restoring the water quality in the 303(d) listed portion of the stream.

- **Temperature**

One factor that has an enormous effect on water quality is temperature. The rates of all biological and chemical processes depend on temperature. Aquatic organisms from benthic macroinvertebrates to fish are dependent on certain temperature ranges for their optimal health. If temperature falls outside this optimal range for a prolonged period of time, organisms become stressed and can die. Contaminants in the water also become more toxic at higher temperatures.

Temperature affects the oxygen content of the water (as water temperature increases, its ability to hold oxygen decreases), the rate of photosynthesis by aquatic plants, the metabolic rates of aquatic organisms, and the sensitivity of organisms to toxic wastes, parasites, and diseases.

Causes of temperature change include:

- Weather
- The removal of riparian vegetation
- Impoundments (a body of water confined by a barrier like a dam)
- Discharge of cooling water
- Urban storm water
- Groundwater inflows to the stream

Temperature in a stream can vary with width and depth. Water temperature can be significantly cooler in shaded portions on a sunny day compared to unshaded portions. In a small stream, the temperature will be relatively constant as long as the stream is uniformly in sun or shade. In a large stream, temperature will vary

considerably with width and depth, regardless of shade. Therefore, temperature should be measured at the same place every time.

III. Leading Sources of Water Quality Impairment in Missouri Rivers

- Urban runoff/ Storm sewers
- Mining
- Hydro/habitat modification
- Atmospheric deposition
- Natural sources
- Agriculture
- Domestic point sources
- Industrial point sources
- Unknown

(Source: Ranked according to available data from Missouri DNR's *Missouri Water Quality Report, 2006*)

Goals of the Volunteer Water Quality Monitoring Program

- Inform and educate citizens about the conditions of our streams
- Establish a monitoring network
- Enable citizens to make informed decisions
- Halt the degradation of our streams

IV. The Volunteer Water Quality Monitoring Program is open to anyone who is interested in water quality. The only requirements are a sincere interest, concern for streams, and a willingness to contribute time for monitoring.

- There are no fees.
- There are different levels of involvement and commitment that build upon each other. This flexible program allows you, the volunteer, to choose your own level of participation in monitoring activities.

V. Monitoring Levels

Introductory

This is the entry level of monitoring that includes watershed mapping, site selection, stream discharge, and biological monitoring. The primary emphasis is education about watersheds. These classes are usually offered in the spring and early summer of each year.

Level 1

Volunteers are eligible to attend a Level 1 workshop once they have completed the Introductory workshop (meaning attended the entire class) and submitted Site Information data, Stream Discharge, and Macroinvertebrate data at least once. Level 1 training reviews biological monitoring and teaches the volunteer how to conduct both chemical and physical monitoring. This is the workshop in which the volunteer is provided chemical monitoring equipment. A quality control designation of Level 1 indicates that the volunteer has completed the 8-hour Level 1 workshop. Level 1 classes are offered in the late summer and early fall of each year.

Level 2

Volunteers are eligible to attend a Level 2 workshop once they have completed the Level 1 workshop (meaning they attended the entire class) and have submitted all four types of data: Visual Survey, Macroinvertebrate, Stream Discharge, and Water Chemistry data.

Attending a Level 2 workshop allows volunteers to do these things:

- Check chemical monitoring equipment to ensure its proper function
- Improve chemical monitoring techniques
- Improve the ability to correctly identify macroinvertebrates. Assistance will be available to identify unknown invertebrates from streams and confirm identification of invertebrates in reference collections.

Level 2 data is assigned the quality control designation, and indicates that a volunteer has successfully completed the Level 2 Quality Assurance/Quality

Control Workshop. Level 2 workshops are usually offered during the winter of each year.

Level 3

A volunteer must have successfully completed the Level 2 workshop before being eligible for Level 3. Volunteers who regularly submit all four data sets may be the most comfortable taking the Level 3 evaluation.

The designation of Level 3 indicates that program personnel have successfully evaluated the volunteer in the field at their monitoring site. This evaluation is scheduled by appointment only. *It is recommended that the volunteer request evaluation during a time of year they regularly sample macroinvertebrates.* By doing so, the volunteer ensures the highest level of familiarity and confidence identifying the types and seasonal sizes of invertebrates in their stream.

VI. Today's Workshop Goals

- Provide introductory information and training about watersheds and stream discharge
- Qualify the student for equipment to conduct biological monitoring
- Assist with site selection
- Facilitate networking of volunteers

VII. What is expected from the volunteers?

- Share knowledge and information gained from this workshop and from monitoring efforts with others
- Periodically monitor a stream
- Submit data collected in a timely manner. Volunteers cannot attend a Level 1 workshop unless they have submitted biological data, stream discharge data, and site information.

VIII. Uses of Volunteer Data

In General

- Inform and educate people about the condition of our streams
- Establish baseline information due to its scarce or non-existent nature on many streams
- Locate emerging problems
- Identify long-term trends on stream conditions
- Supplement agency-collected data

Level 2 and 3 Data:

- Evaluate best management land use practices (BMPs)
- Aid in planning by local agencies, i.e. for zoning regulations
- Aid in planning and permitting within DNR
- Supplement Missouri DNR's Biennial 305(b) Report to EPA on the condition of the state's waters, commonly called the *Missouri Water Quality Report*

IX. The Volunteer Water Quality Monitoring Program takes a holistic approach to monitoring.

- A stream is a reflection of its watershed. This program places emphasis on looking at the entire watershed.
- The water quality of a stream is a combination of its physical, chemical, and biological characteristics.

For more information on the Stream Team Program, visit our website:

<http://www.mostreamteam.org>